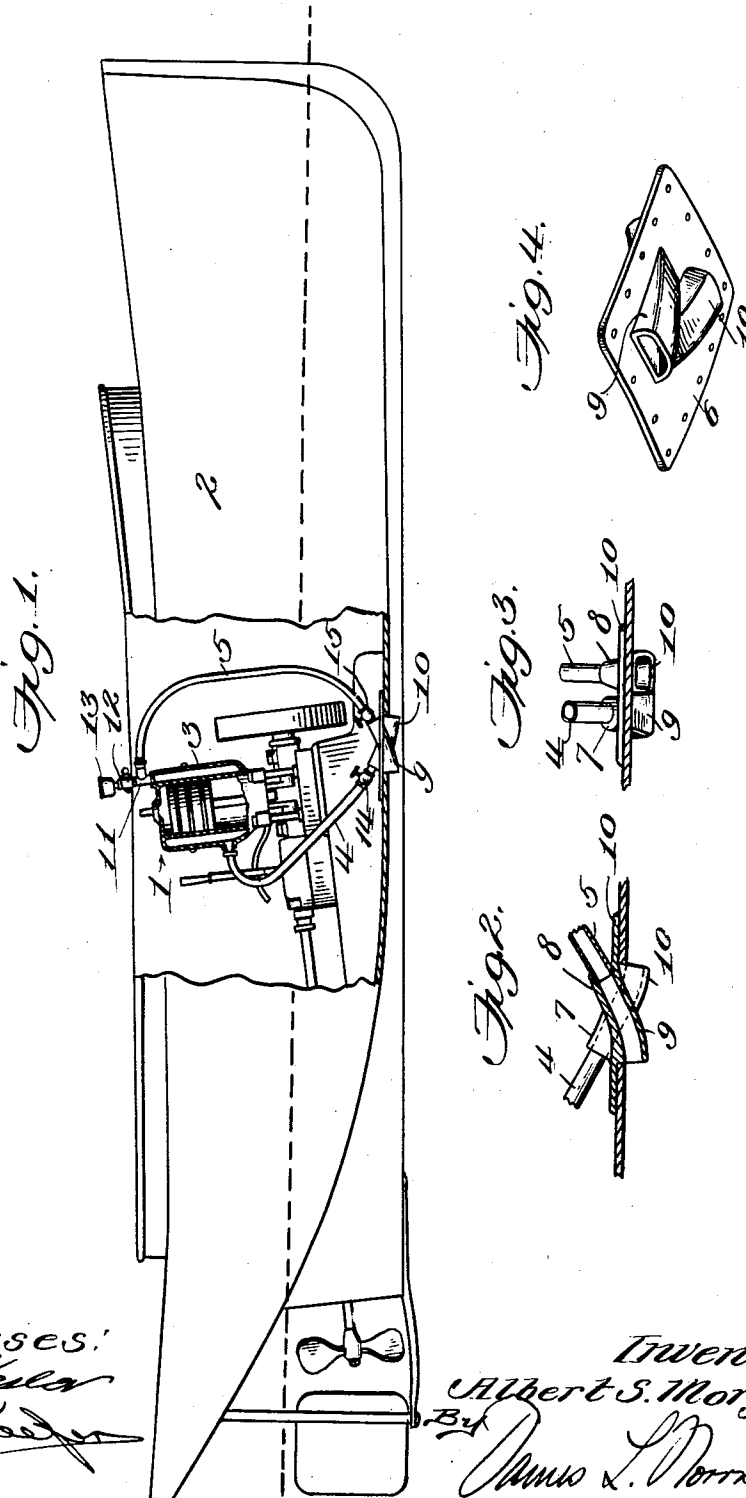


A. S. MORGAN.
 COOLING ARRANGEMENT FOR MOTOR BOAT ENGINES.
 APPLICATION FILED APR. 26, 1910.

968,385.

Patented Aug. 23, 1910.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALBERT S. MORGAN, OF WINFIELD, WEST VIRGINIA.

COOLING ARRANGEMENT FOR MOTOR-BOAT ENGINES.

968,385.

Specification of Letters Patent. Patented Aug. 23, 1910.

Application filed April 26, 1910. Serial No. 557,657.

To all whom it may concern:

Be it known that I, ALBERT S. MORGAN, a citizen of the United States, residing at Winfield, in the county of Putnam and State of West Virginia, have invented new and useful Improvements in Cooling Arrangements for Motor-Boat Engines, of which the following is a specification.

This invention relates to improvements in cooling arrangements for motor boat engines.

Heretofore, in using water as a medium for cooling the cylinders of motor boat engines, it has been usual to combine with the engine a pump to maintain a positive and efficient circulation of the water. This arrangement, while practical, has a number of features of disadvantage, among which may be mentioned that it takes power from the engine; that it provides for leakage of water into the engine pit, the collected moisture interfering with the service of the electrical connections; and that in cold weather the moisture adhering to the movable parts becomes frozen and interferes with the operation of the pump, thus necessitating a preliminary application of heat, either by using hot water or by the direct application of a flame, where hot water is not available.

The present invention overcomes the foregoing disadvantages incident to a pumping system by an arrangement in which provision is made for a "natural" circulation of the cooling water, that is, a circulation which is effected by the utilization of a law or laws of nature and not by the use of some added mechanical arrangement.

An illustration of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a motor boat with its central portion broken away to illustrate the engine and its circulation adjuncts, the engine being shown in section; Fig. 2 is a detail longitudinal sectional view showing a specially constructed connection which is fitted in the bottom of the boat and to which the circulation pipes are joined; Fig. 3 is a cross sectional view of the same; and Fig. 4 is a detail perspective view of the same.

Similar characters of reference designate corresponding parts throughout the several views.

The engine, designated by the numeral 1, is suitably positioned in the hull 2 above the

water line and its cylinder is provided with the usual surrounding water jacket 3.

The means for inducing a natural circulation of water through the jacket 3 comprises a pair of pipes, as 4 and 5, and their adjuncts. The pipes 4 and 5 are arranged in a specifically novel manner, the pipe 4 being an inflow pipe and the pipe 5 being an outflow pipe. The said pipes extend from the bottom of the hull 2 to their points of communication with the jacket 3 and are in communication with the body of water through which the boat is driven. In order that the circulation may be rapid and at the same time proportionate to the speed of the engine, the open lower end of the pipe 4 points forwardly in a direction parallel to the longitudinal axis of the hull and the open lower end of the pipe 5 points rearwardly in a similar direction. By so arranging the open ends of the pipes 4 and 5, when the boat is in motion a forcing or pressure influence is obtained at the open end of the pipe 4 and a suction influence is obtained at the open end of the pipe 5.

For the sake of compactness it is preferred to have the lower ends of the pipes 4 and 5 in closely associated relation and an advantageous adjunct for this purpose comprises a plate, as 6, which is secured to the floor of the hull and which is fitted over an opening in said floor and is provided on its upper face with nipples, as 7 and 8, the former receiving the end of the pipe 4 and the latter receiving the end of the pipe 5. These nipples extend in opposite directions and are made continuous with inflow and outflow channels, as 9 and 10, respectively, these channels being disposed on the under side of the plate 6 and pointing in opposite directions. As a matter of convenience the plate 6 and nipples 7 and 8 and the channels 9 and 10 are made integral. The pipes 4 and 5 communicate with the jacket 3 at any suitable point. It is preferred that one of said pipes communicate with the highest point of the jacket and that the other pipe communicate with said jacket at a point below said highest point. As shown, the point of communication of the pipe 4 with the jacket 3 is lower than the point of communication of the pipe 5 with said jacket. The said pipe 5 is joined at its upper end to a T-coupling, as 11, one branch of which communicates with the jacket 3 and a second branch of which carries an extension

which is provided with a controlling valve, as 12, fitted in an air tight manner and with a filling cup, as 13. The pipes 4 and 5 at their lower ends and closely adjacent the nipples 7 and 8, are provided with gate valves 14 and 15, respectively.

In use, assuming that all the valves are open, the circulation system is primed by closing the valves 14 and 15 and by pouring water into the jacket 3 through the filling cup 13 until the jacket is filled, whereupon the valve 12 is closed and the valves 14 and 15 are opened. Since the lower ends of the pipes 4 and 5, or more correctly, the channels 9 and 10, are submerged in the water and since the valve 12 is closed, so as to prevent access of air to the jacket 3, the water poured into said jacket will not drain out by gravity, but will remain at the height aforesaid. The valves 14 and 15 having been opened as above set forth, when the engine is running and the boat is consequently moving, a natural circulation of water through the cooling system is effected, this circulation being due to the pressure influence at the mouth of the pipe 4 and to the suction influence at the mouth of the pipe 5, both of these influences being an incident of the forward movement of the boat, as is obvious. It will thus be apparent that water flows continuously through the pipe 4, the jacket 3 and the pipe 5 being returned by the latter to the body in which the boat is traveling.

The rate of circulation may be regulated by properly adjusting either of the valves 14 and 15. The only operation necessary to drain the system is to open the valve 12 to admit air above the column of water in the jacket 3. In case the movement of the boat should be reversed, the pipe 5 becomes the inflow pipe and the pipe 4 becomes the outflow pipe.

The advantages of the aforesaid system and means of circulation are numerous. Among these advantages may be mentioned that all movable parts are eliminated and no power is taken from the engine to effect the circulation. No moisture is deposited upon the floor of the boat as an incident of the circulation of the cooling water as in the arrangements which employ mechanically operated adjuncts to effect the circulation. The operation of the system is not affected by extreme cold for the reason that the system may be efficiently drained and that in case any water remaining in the jacket should become frozen the thawing of this frozen water is accomplished by the natural heat developed by the engine. The circulation is rapid and not sluggish and is commensurate with the speed of the engine. It is also noiseless. The parts are not affected by grit as is the case with the ordinary pumping arrangement. No particular

design of engine is required nor is it necessary to remodel the hull or to have a hull of special construction. The circulation adjuncts may be as readily applied to old engines as to new. The engine is disposed in any convenient position proper for the balancing of the boat, above the water line. Withal, the system is one which may be supplied and installed at the lowest possible cost; which has the maximum of efficiency; and which embodies no movable parts liable to wear or breakage or to be affected by weather conditions. Once installed, its life is coextensive with the life of the engine.

Having fully described my invention, I claim:

1. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and with the exterior of the hull, the end of the inflow pipe pointing forwardly in a direction parallel to the longitudinal axis of the hull and being submerged in the water surrounding the hull, an air admission valve for the jacket and a valve in at least one of said pipes.

2. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and with the exterior of the hull, the ends of said pipes being submerged in the water surrounding the hull and the end of the outflow pipe pointing rearwardly in a direction parallel to the longitudinal axis of the hull, an air admission valve for the jacket and a valve in at least one of said pipes.

3. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and with the exterior of the hull at points below the water line, the end of the inflow pipe pointing forwardly in the direction of the longitudinal axis of the hull and the end of the outflow pipe pointing rearwardly in the direction of the longitudinal axis of the hull, an air admission valve for the jacket and a valve in at least one of said pipes.

4. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and a plate fitted in a wall of the hull and having means for putting the ends of said pipes in communication with the exterior of the hull below the water line.

5. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and a plate fitted in the floor of the

hull and having nipples on its upper side to receive the ends of said pipes and forwardly and rearwardly directed open-ended channels on its under side, communicating with
5 the respective nipples.

6. The combination with a hull and an engine disposed in the hull and having a jacket above the water line, of an inflow pipe and an outflow pipe communicating with the
10 jacket and with the exterior of the hull below the water line, valves provided in said pipes, and an air admission valve for the jacket.

7. The combination with a hull and an
15 engine disposed in the hull and having a

jacket above the water line, of an inflow pipe and an outflow pipe communicating with the jacket and with the exterior of the hull below the water line, valves provided in said pipes, an air admission valve for the jacket, 20 and a filling cup associated with the air admission valve and having its communication with the jacket controlled by said valve.

In testimony whereof I have hereunto set my hand in presence of two subscribing wit- 25 nesses.

ALBERT S. MORGAN.

Witnesses:

JOHN MORGAN,
J. M. CARNY.